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The Western Rock Lobster Fishery 1979–1980

BY

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AND

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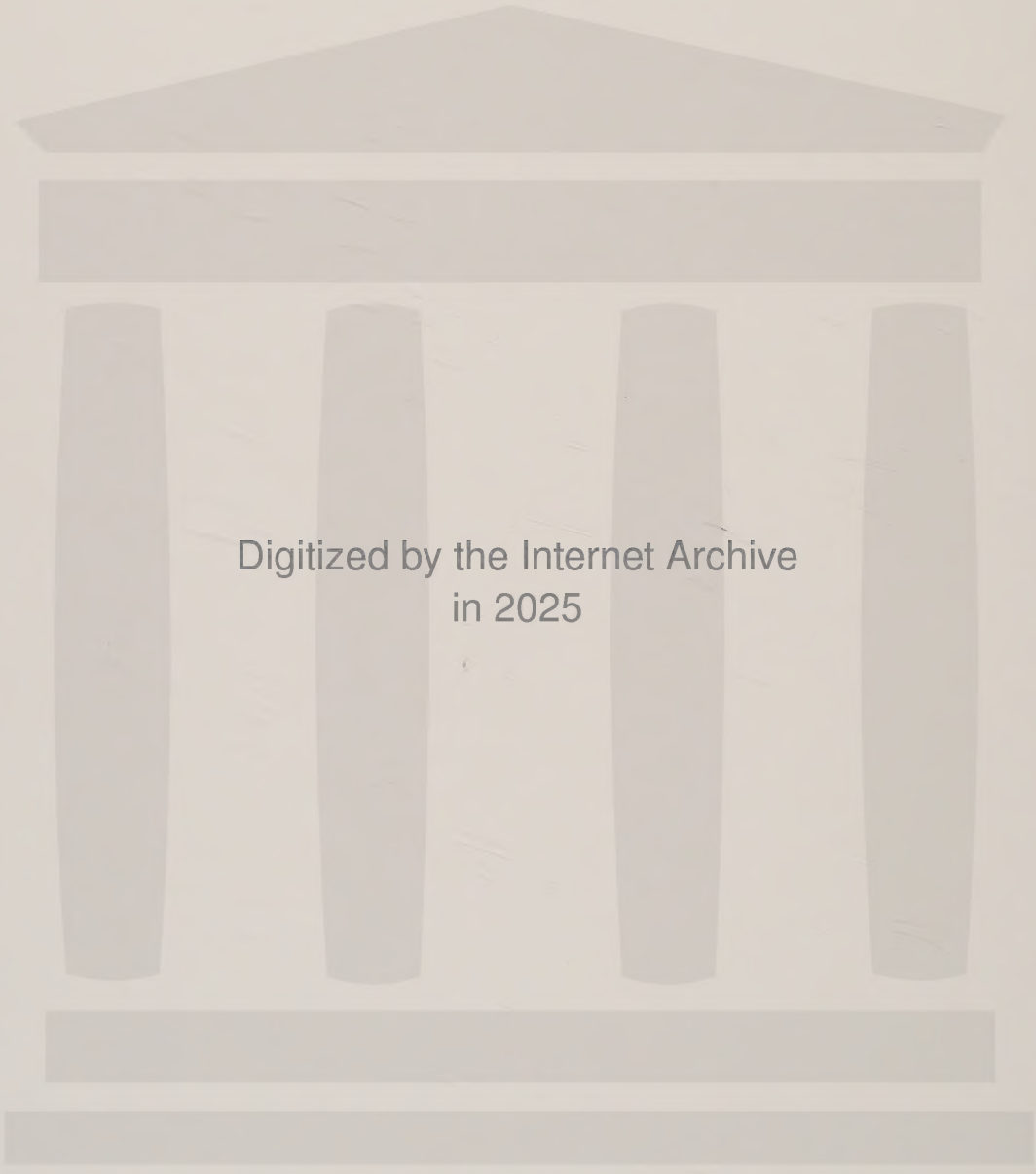
PERTH
WESTERN AUSTRALIA

1985



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PERTH

R E P O R T

No. 69

THE WESTERN ROCK LOBSTER FISHERY 1979-1980

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THE WESTERN ROCK LOBSTER FISHERY 1979/80

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I INTRODUCTION

The fishery for the western rock lobster *Panulirus cygnus* is one of the most important single fisheries in Australia and an important export earner for the State. Western Australia produced 10 724 tons in 1979/80, out of a total Australian catch of rock lobster of 14 739 tons. The fishery is governed by a complex set of regulations which have been reviewed by Bowen (1971) and Hancock (1981) and which are designed to limit the total fishing effort to acceptable levels and to enforce a legal minimum size. It is thus important to constantly monitor the state of the fishery both to ensure that the fishing effort is remaining within the accepted limits and that the regulations are adequately performing their function of maintaining reasonably stable catches. Inherent in this monitoring of the fishery is a careful examination of fishing practice, gear, etc. which may lead to increases in efficiency which may not be detectable through the usual calculations of fishing effort.

This paper is the ninth of a series of annual reviews of the previous rock lobster season which will discuss fishing practice, catches, effort, mean size and various other factors, a knowledge of which will help towards a better understanding of the status of the fishery.

II METHODS

Catch and effort data were extracted from figures obtained from fishermens' monthly returns and supplied by the Australian Bureau of Statistics and also from rock lobster research log book data, while mean size information was gathered from measurements made by Departmental Research Staff aboard commercial vessels fishing from Dongara, Jurien, Lancelin and Fremantle. Information on trends in fishing practice was gathered principally from conversation with fishermen at various ports as well as from comments made in research log books.

III RESULTS

A. CATCH AND EFFORT DATA

The fishing season extends from 15 November to 30 June and may be subdivided into three distinct phases, viz (i) the "whites" fishery (George, 1958) which begins suddenly in late November (as pale-coloured newly-moulted rock lobsters leave the shallow reef areas) and arbitrarily finishes on 31 December; and (ii) the "coastal red" fishery which

begins on 1 January and ends on 30 June. The season in the Abrolhos Islands fishery is restricted to the period 15 March to 30 June.

In fishing seasons prior to 1977/78 both the coastal and the Abrolhos Islands fisheries ended on 14 August. The season was shortened by six weeks in 1977/78 as a conservation measure (Hancock, 1981).

In 1979 the "whites" run commenced in Geraldton on about 20 November, in Jurien about 24 November and in Fremantle about 23 November.

Catches (kg) and fishing effort (in number of pot lifts) were as follows:

"Whites" catch	(15 Nov-31 Dec)	=	3 838 983 kg
"Whites" effort	(" " ")	=	2 823 068 Pot lifts
"Coastal Reds" catch	(1 Jan-30 June)	=	5 390 381 kg
"Coastal Reds" effort	(" ")	=	6 689 269 Pot lifts
Abrolhos catch	(15 Mar-30 June)	=	1 468 696 kg
Abrolhos effort	(" " ")	=	1 211 772 Pot lifts
Total		=	10 698 060 kg
Total effort		=	10 724 109 Pot lifts

These figures do not include unrecorded sales (i.e. rock lobsters which are sold for cash, etc. and are not recorded in the fishermens' monthly returns of catches which totalled approximately 314 500 kg), or the total amateur catch which is estimated at approximately 200 000 kg (Norton, 1981). Figure 1 shows comparative catch, fishing effort, i.e. the number of pot lifts[+] and catch per fishing effort data from previous years.

Catch and effort data from various statistical blocks (Figure 2) are shown in Table 1 with catches expressed in kg weight and fishing effort as number of pot lifts. Table 2 shows catch per pot data for the same statistical blocks. The total fishing effort was 10 724 109 units of fishing effort, 1.1% less than the 1978/79 season.

B[*] EXPORTS AND GRADE CATEGORIES

Rock lobster tails processed for export are graded by weight and packed in 11.34 kg cartons. The various grades, together with the percentage of cases packed in each grade

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[+] Fishing effort is measured as the number of pot lifts (pulls) recorded by fishermen in their Australian Bureau of Statistics monthly returns. In the annual reports prior to 1977/78 fishing effort was calculated as effective fishing effort by the method of Gulland (1969).

[*] Section B is based on data provided by selected processing establishments from Fremantle to Geraldton.

for the period November 1979 to June 1980 were as follows:

Grade	% of Cases
A (140 - 179 grams)	24.2
B (180 - 239 grams)	38.6
C (240 - 279 grams)	15.8
D (280 - 359 grams)	10.0
E (360 - 479 grams)	6.1
F (480 - 599 grams)	3.4
G (600 - grams)	1.9

C. MEAN SIZE

Samples of rock lobsters were measured aboard commercial vessels using standard pots with 54 mm escape gaps in four depth categories at various ports. The sample would hence include all commercial size rock lobsters, plus undersize which would have been reduced in number by selection by the escape gap (Bowen, 1963). Mean carapace lengths of males and females in the various depth categories at Fremantle, Lancelin, Dongara and Jurien throughout the fishing season have been compared in Table 3. The many omissions in the table are due to either fishermen not fishing the area in question or to some circumstance (breakdown, etc.) which prevented the data from being collected.

D. NUMBER OF BOATS

The number of boats licensed in Zones A, B, C, D and E to fish for rock lobsters is carefully controlled, though boat owners are able to nominate their choice of fishing area, viz. north or south of 30°S.As at 21 October 1980 the number of boats licensed to fish in the various zones was as follows:

Number of boats licensed in 1979/80	=	794
Number of boats licensed in Zone A	=	204
Number of boats licensed in Zone B	=	166
Number of boats licensed in Zone C	=	408
Number of boats licensed in zone D	=	7
Number of boats licensed in Zone E	=	9

E. FORECAST OF 1979/80 RECRUITMENT

As a result of continuing high levels of puerulus settlement in earlier years, recruitment to the fishery during 1979/80 was good, resulting in a high commercial catch.

F. INTRODUCTION OF NEW LEGISLATION

As from 1 November 1979 the following Commonwealth License fees were charged.

TYPE OF LICENSE	NEW FEE
License to Engage in Fishing	$ 20
Fishing Boat License:	
Less than 15 m overall length	$ 40
15 m but less than 20 m	$ 50
20 m and over	$ 60
Transfer of Boat License	$ 1
Issue of Duplicate License	$ 1

As from 31 August 1979 those fishermen with an Abrolhos Island concession were no longer required to cease fishing coastal rock lobster areas two weeks before the commencement of the Albrolhos season.

The 1979/80 season was again closed six weeks early, viz. 30 June, this included both the coastal and Abrolhos fisheries.

The closed season for rock lobsters, viz. 1 July to 14 November was extended south of 34° 24' South latitude to include the taking by any means of capture whatsoever in all Western Australian waters south of 21° 44' South latitude the Southern Rock Lobster, *Jasus novaehollandiae*.

The notice giving effect to both the above closures was published in the Government Gazette on 28 September 1979.

As from 31 August 1979 a new formula was introduced which established a minimum and maximum overall length for replacement boats based on the pot entitlement of the boat to be replaced.

As from 14 December 1979 the Fisheries Act was changed and now prohibits any person who carries on business as a fish shop, hotel, restaurant, fish auction, fish market or other commercial enterprise from purchasing any fish (including rock lobsters) whether processed or unprocessed from any person who is not authorised to sell fish under the provisions of the Fisheries Act. In addition fish purchasers now have to maintain a legible record of their purchases.

As from 31 August 1979 Section 55A of the Fisheries Act was amended so that any record of offences associated with the boat that is being replaced is transferred to the replacement boat and not the boat replaced. The amended Section also provides that the period for the accumulation of offences against a boat shall be restricted to ten years.

Following a review of fees payable under Section 34 the following fees for licenses to engage in limited entry fisheries were adopted.

ROCK LOBSTER FISHERY

Zone A - $4.30 per pot
Zone B - $4.30 per pot
Zone C - $4.30 per pot
Zone D - $4.30 per pot
Zone E - $2.50 per pot

As from 14 December 1979 the Fisheries Act was amended to allow for higher penalties for certain offences. The penalties were increased to keep pace with inflationary trends.

Amendments to the Fisheries Act now provide additional security for information held by the Department. The Act now stipulates that it is an offence for any person to disclose or make use of any information contained in a return, e.g. research data voluntarily supplied by fishermen or otherwise given to him in connection with the Act.

Information regarding these changes to the legislation governimg the rock lobster fishery, as well as the Fisheries Department's policies on various issues, may be found in the following volumes of the Fishing Industry News Service (F.I.N.S.):

Vol. 12 No. 3 (September 1979) pp. 45,46,49,50.
Vol. 13 No. 1 (Autumn 1980) pp. 6,9,12,13.

G. EFFECTS OF NEW LEGISLATION

That the Abrolhos Island concession holders were no longer required to cease coastal fishing operations two weeks prior to the commencement of the Abrolhos season and as a result of many of these vessels continuing to fish the coastal grounds right up until moving to the Abrolhos, placed additional fishing pressure on those coastal grounds.

It was again considered necessary to close the season six weeks early, viz. 30 June, as the period 1 July to 15 August had the potential for the greatest growth in fishing effort.

As a result of the new boat replacement policy which establishes a minimum and maximum overall length based on the pot entitlement the efficiency of the fleet may in the long term increase. viz. improvement in vessel design enabling boats to shift gear more rapidly, work offshore grounds and work in virtually all weather and sea conditions.

The other changes in the legislation were of an administrative nature and hence had little direct effect on levels of catch and fishing effort.

H. INNOVATIONS TO BOATS AND GEAR

Data supplied by the Marine and Harbours Department showed that a total of 71 boats were replaced during the

period 1 July 1979 to 30 June 1980. In the northern area a total of 33 boats were replaced, these ranged in size from 7.8 metres to 15.9 metres with an average size of 11.13 metres, whilst in the southern area a total of 38 boats were replaced ranging in size from 9.32 metres to 18.30 metres and averaging 12.78 metres in length. As in the previous season the trend in the northern area was towards small to medium sized vessels and medium to large sized vessels in the southern area. During this period there was a reduction of 18% on the number of vessels replaced during the 1978/79 season. The boat replacements were constructed as follows:

	WOOD	FIBREGLASS	ALUMINIUM
FREMANTLE	6	29	3
GERALDTON	-	21	12
	6	50	15

Data from research log books* showed the following usage of various types of pots by fishermen north and south of 30°S:

	STICK AND CANE BEEHIVE	BATTEN	STEEL BEEHIVE	STEEL TRAPS
NORTH 30°S	10%	83%	6%	1%
SOUTH 30°S	58%	24%	9%	9%

Mainly in the southern sector of the fishery the trend towards the use of larger than normal batten and beehive pots continued. Also in the southern area of the fishery, large steel traps with side necks constructed of trawl mesh gained in popularity. A small number of plastic pots were again used throughout the fishery.

As in the previous season, rope shedders, a simple hand operated device attached to the pot winch were used on a number of boats.

I. BAIT

Data from research log books showed the following usage of bullock hocks and pieces of cattle hide as holding bait in both northern and southern areas:

	HOCKS	HIDES
North 30°S	42%	58%
South 30°S	38%	62%

During the 1979/80 season and in the northern area of the fishery the most popular fish baits used in combination with bullock hocks or pieces of bullock

* Twenty four percent of skippers voluntarily submitted rock lobster research records during the 1979/80 season.

hide were: Australian herring or ruff (*Arripis georgianus*), mullet (*Mugil cephalus*), pilchards (*Sardinops neophilchardus*), scaly mackerel (*Amblygaster postera*), Australian salmon heads (*Arripis trutta esper* and *Arripis trutta marginata*) and New Zealand salmon heads and pieces of salmon meat (*Arripis trutta trutta*). In the southern area of the fishery the most popular fish baits, also used in combination with hocks and hides, were: Australian and New Zealand salmon heads and pieces of salmon meat, pilchards, snapper heads (*Chrysophrys auratus*), mullet, scaly mackerel and Australian herring or ruff. Throughout the fishery a great range of fish baits were available and were used. Usually in combination with hocks and hides.

Although Southern Ocean Fish Processors had ceased processing rock lobster bait, some remaining in cold storage was available throughout the 1979/80 season.

The use of Craylure, a prepared rock lobster bait, ceased during this season.

J. DISTRIBUTION OF FISHING

The distribution of fishing is shown in Table 1. The pattern of fishing does not vary greatly from season to season and is dependent on the density of rock lobsters in the various depth categories. Throughout the season the usual pattern of fishing occurred, i.e., concentrated in the shallows during November and December, followed by deep water potting during the latter part of December, January, February, back to the shallows during the latter part of February, March and April and in mixed depths (mainly shallower), depending on weather and density of rock lobsters, throughout the remainder of the season.

During 1980 a number of vessels again fished from South Passage in Shark Bay. The number of vessels that fished from this anchorage during 1980 increased on the previous season.

During January and February exceptionally large catches of migratory "whites" were taken in very deep water (80 - 90 fathoms) from west of Garden Island to west of Mandurah by boats fishing from Fremantle, Safety Bay and Mandurah. The area in question had been fished in previous seasons but catches of the magnitude taken this season had not been experienced before.

K. AVERAGE NUMBER OF DAYS WORKED PER BOAT PER MONTH

Month	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.
Days Worked	12.7	24.1	17.4	20.2	22.1	20.3	19.0	15.1

The average number of days worked per boat during November and December was 7.0 down on the 1978/79 season and for the period January to June was 2% down on the 1978/79 season.

The average number of days worked per boat per month for the 1979/80 season was 19.0, which was 3.6% less than the 1978/79 season.

L. PRICE OF ROCK LOBSTERS

At the commencement of the 1979/80 season the price paid to fishermen was $6.30 per kg. In December the price dropped to $6.00 per kg and later in the season further dropped to $5.50 per kg. The average cash price paid for the season was approximately $5.90 per kg, whilst the average pool price was approximately $6.20 per kg.

The range of prices paid on the New York wholesale market for rock lobster tails were:

	GRADE	$AUST. PER KG
A	5 - 6oz (140-179 grams)	20.92
B	6 - 8oz (180-239 grams)	19.98
C	8 - 10oz (240-279 grams)	19.69
D	10 - 12oz (280-359 grams)	19.58
E	12 - 16oz (360-479 grams)	18.94
F	16 - 20oz (480-599 grams)	18.59
G	over 20oz (600- grams)	18.11

M. MARKET TRENDS AND ECONOMIC FACTORS

The USA market for W.A. lobster tails, after a steady first half increase in demand and prices, weakened in the second half of the 1979-1980 financial year, due to the ongoing US recession. Prices for rock lobster tails fell back to last year's levels as the US dollar weakened, interest rates rose, and domestic demand slackened leaving wholesalers with large storage inventories.

By the end of June 1980, the market began to firm, and as the seasonal summer demand increased, surplus stocks started to be cleared and prices bottomed out. Imports of Australian lobster tails and cold storage inventories were both 20.0% up on the previous year's level.

The Australian dollar had depreciated against the US dollar by about 3.0% in the first half of the financial year. This trend reversed in the second half as the Australian dollar appreciated about 4.5%, leaving the Australian dollar, 1.5% stronger in terms of the US dollar compared with the 1978-1979 season.

N. AVERAGE VALUE PER POT ON POT REDISTRIBUTION

Prior to the start of the 1979/80 season the price per pot was approximately $1300. Following good catches during the "whites" and high prices paid to fishermen for their catch, the price rose to approximately $2000 and remained stable for the remainder of the season.

O. SEA WATER TEMPERATURES AND SALINITIES

These have relevance to the behaviour and catch rates of rock lobsters (Morgan, 1974). The average sea water temperature during the rock lobster season (i.e., 15 November to 30 June) at Waterman (Aquarium Header Tank) was 22.3°C, with a maximum of 25.2°C on 20 January 1980 and a minimum of 17.0°C on 15 June 1980. The average salinity during the season at Waterman (aquarium) was 35.51‰ with a maximum of 36.24‰ on 24 March 1980 and a minimum of 34.86‰ on 25 June 1980.

Bottom temperatures and surface salinities in waters of various depths in the Fremantle, Lancelin, Jurien and Dongara areas were collected as part of the monitoring of rock lobster catches (Item B) and are shown in Table 4. Other records are maintained by C.S.I.R.O.

P. SPAWNING ROCK LOBSTERS

While most of the breeding females are found in the 20 - 30 fathom range, no variation has been observed in the size at first breeding from one depth category to another, except at Jurien over 30 fathoms (Chittleborough, pers. comm.). Hence the data for December, January and February from all depths with the exception of Jurien over 30 fathoms may be pooled to indicate the size frequency of breeding (i.e., "berried" and mated) females and this has been done in Figure 3. The mean size of breeding females was greater at Lancelin and Fremantle than at either Jurien or Dongara with the mean sizes being 97.7 mm for Dongara, 92.3 mm for Jurien, 106.3 mm for Lancelin and 105.8 mm for Fremantle. By comparison the mean sizes at first breeding (i.e., the smallest carapace length at which 50% have been mated) were found to be 97.6 mm at Fremantle, 99.2 mm at Lancelin, 94.3 mm at Jurien and 90.8 mm at Dongara.

IV DISCUSSION

The 1979/80 rock lobster catch fell by 6.0% from the previous seasons record catch of 11 387 815 kg to 10 698 060 kg. This reduction in catch was mainly the result of reduced puerulus settlement four years earlier hence reduced recruitment to the commercial fishery rather than a reduction in fishing effort (number of pot lifts) by fishermen. This is reflected in the effort figures which showed that the total number of pot lifts remained relatively stable and only fell by 1.0% on the previous season and that the average number of days worked per boat per month fell by only 3.6% on the previous season.

Economic conditions within the industry were only fair with the increased price (in comparison to the previous season) paid to fishermen for their catch being offset by stiff increases in major items of expenditure, namely fuel and some popular lines of bait. This was again reflected in the number of new boat replacements which fell by 18% on the 1978/79 season.

V ACKNOWLEDGEMENTS

Measurements on board fishing vessels were performed by Mr. G. Lymn and Mr. A. Hayson. The information on Market Trends and Economic Factors was provided by Mr. P. Rogers of the Fisheries Department.

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TABLE 1: CATCH (IN KG WEIGHT) AND FISHING EFFORT (IN POT LIFTS) FOR THE 1979/80 ROCK LOBSTER SEASON IN VARIOUS STATISTICAL BLOCKS.

BLOCK	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
2413	-	-	-	-	-	-	-	-	-
2512	-	-	-	5781 (2520)	-	-	-	2046 (1700)	7827 (4220)
2612	-	-	883 (3060)	-	-	-	-	1000 (1440)	1883 (4500)
2613	-	-	11822 (5140)	4321 (3311)	-	-	4751 (4356)	10190 (5346)	31084 (18153)
2712	-	-	-	-	-	-	-	1109 (960)	1109 (960)
2713	7690 (9895)	46499 (29042)	34096 (39272)	26319 (34091)	46800 (30861)	41432 (33120)	31742 (33851)	16424 (22468)	251002 (232600)
2714	4703 (7249)	27050 (18881)	4952 (9874)	5276 (7072)	17432 (12228)	13590 (10395)	9810 (12942)	8301 (9129)	91114 (87770)
2812	-	-	-	425 (1664)	-	-	-	-	425 (1664)
2813	672 (1200)	10141 (9021)	725 (1935)	3512 (3591)	566651 (250752)	542765 (425782)	264462 (348855)	94818 (186383)	1483746 (1227519)
2814	122909 (128399)	209138 (221971)	50617 (120285)	57624 (131049	80150 (99344)	68212 (80619)	43748 (79232)	53409 (73589)	685807 (934488)
2912	-	-	-	-	-	-	-	-	-
2913	858 (1302)	18164 (11652)	2558 (3030)	700 (1020)	22045 (12206)	16065 (13279)	2320 (2585)	892 (1750)	63602 (46824)
2914	320515 (319508)	806544 (535614)	153781 (283444)	191679 (358483)	276137 (290930)	198410 (226175)	126628 (213127)	112703 (170589)	2186397 (2397870)
3012	-	-	-	-	-	-	-	-	-
3013	-	-	-	-	-	-	-	-	-
3014	125605 (147978)	583279 (325404)	162497 (224096)	133056 (216766)	268408 (277553)	254397 (207224)	80377 (158770)	45228 (102444)	1652847 (1660235)
3015	19804 (27084)	105577 (56343)	44529 (57966)	41794 (63855)	56494 (66835)	31683 (52770)	12352 (27972)	8276 (21024)	320509 (373849)
3112	-	-	-	-	-	-	-	-	-
3113	-	-	-	-	-	-	-	-	-
3114	6522 (12739)	80547 (44415)	30698 (35499)	18761 (24861)	32108 (32149)	8712 (13202)	112 (450)	93 (225)	177553 (163540)
3115	127208 (204347)	727677 (444079)	419039 (343537)	288762 (395630)	343007 (437124)	176535 (274817)	88366 (209165)	48724 (119162)	2219318 (2427861)
3212	-	-	-	-	-	-	-	-	-
3213	-	-	-	-	-	-	-	-	-
3214	-	30689 (11531)	22988 (12558)	12794 (5973)	20603 (12924)	16383 (11190)	11641 (12911)	9521 (8727)	124699 (75814)
3215	33651 (62376)	398155 (173327)	329198 (152096)	161211 (154966)	156443 (176754)	75667 (105736)	56880 (82314)	41741 (57183)	1252946 (964752)
3314	660 (1320)	6926 (4851)	15853 (8581)	7242 (5151)	8133 (5446)	9878 (6595)	873 (720)	1181 (1170)	50746 (33834)
3315	2133 (3175)	15667 (10365)	12500 (9225)	20990 (9350)	7594 (4750)	5967 (2820)	7657 (7911)	7730 (6250)	80238 (53846)
3414	-	-	3670 (1755)	1775 (1725)	1728 (1840)	3214 (3785)	3401 (2920)	1420 (1785)	15208 (13810)
TOTAL	772930 (926572)	3066053 (1896496)	1300406 (1311353)	982022 (1421078)	1903813 (1711696)	1462910 (1467509)	745120 (1198081)	464806 (791324)	10698060 (10724109)

TOTAL CATCH = 10 698 060 Kg
TOTAL EFFORT = 10 724 109 Pot Lifts

EFFORT FIGURES ARE SHOWN IN PARENTHENTHESIS AND CATCH FIGURES ARE UNDERLINED.

NOT INCLUDED IN THESE CATCH FIGURES ARE 10,881 KG OF ROCK LOBSTERS TAKEN BY DIVING.

THESE FIGURES ARE DERIVED FROM DATA KINDLY PROVIDED BY THE AUSTRALIAN BUREAU OF STATISTICS, AND REFLECT SLIGHTLY MORE INTENSIVE EDITING BY THE DATA PROCESSING SECTION OF THE DEPARTMENT OF FISHERIES AND WILDLIFE.

TABLE 2: CATCH (KG) PER UNIT OF FISHING EFFORT (I.E. KILOGRAM OF ROCK LOBSTERS PER POT LIFT) DATA FOR 1979/80 SEASON IN VARIOUS STATISTICAL BLOCKS (SEE FIGURE 2).

BLOCK	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
2413	*	-	-	-	-	-	-	-	-
2512	-	-	-	2.29	-	-	-	1.20	1.85
2612		-	0.29	-	-	-	-	0.69	0.42
2613	-	-	2.30	1.31	-	-	1.09	1.91	1.71
2712	-	-	-	-	-	-	-	1.16	1.16
2713	0.78	1.60	0.87	0.77	1.52	1.25	0.94	0.73	1.08
2714	0.65	1.43	0.50	0.75	1.43	1.31	0.76	0.91	1.04
2812	-	-	-	0.26	-	-	-	-	0.26
2813	0.56	1.12	0.37	0.98	2.26	1.27	0.76	0.51	1.21
2814	0.96	0.94	0.42	0.44	0.81	0.85	0.55	0.73	0.73
2912	-	-	-	-	-	-	-	-	-
2913	0.66	1.56	0.84	0.69	1.81	1.21	0.90	0.51	1.36
2914	1.00	1.51	0.54	0.53	0.95	0.88	0.59	0.66	0.91
3012	-	-	-	-	-	-	-	-	-
3013	-	-	-	-	-	-	-	-	-
3014	0.85	1.79	0.73	0.61	0.97	1.23	0.51	0.44	1.00
3115	0.73	1.87	0.77	0.65	0.85	0.60	0.44	0.39	0.86
3112	-	-	-	-	-	-	-	-	-
3113	-	-	-	-	-	-	-	-	-
3114	0.51	1.81	0.86	0.75	1.00	0.66	0.25	0.41	1.09
3115	0.62	1.64	1.22	0.73	0.78	0.64	0.42	0.41	0.91
3212	-	-	-	-	-	-	-	-	-
3213	-	-	-	-	-	-	-	-	-
3214	-	2.66	1.83	2.14	1.60	1.46	0.90	1.09	1.64
3215	0.54	2.30	2.16	1.04	0.89	0.72	0.69	0.73	1.30
3314	0.50	1.43	1.85	1.41	1.49	1.50	1.21	1.01	1.50
3315	0.67	1.51	1.36	2.24	1.60	2.12	0.97	1.24	1.49
3414	-	-	2.09	1.03	0.94	0.85	1.16	0.80	1.10
TOTAL	0.83	1.62	0.99	0.69	1.11	1.00	0.62	0.59	1.00

* -= NO RECORD OF FISHING

TOTAL CATCH = 10 698 060 kg
TOTAL EFFORT = 10 724 109 pot lifts

TABLE 3: MEAN CARAPACE LENGTHS (MM) OF MALE AND FEMALE ROCK LOBSTERS IN VARIOUS DEPTH CATEGORIES AT FREMANTLE, LANCELIN, JURIEN AND DONGARA THROUGHOUT THE FISHING SEASON.

			0-10 fms		10-20 fms		20-30 fms		30+ fms	
YEAR	AREA	MONTH	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
1979/80	FREMANTLE	NOV	80	76						
		DEC	76	72					92	89
		JAN	73	70			108	101		
		FEB	77	74	82	78	119	105		
		MAR	84	77	86	81	95	88		
		APR	73	72			106	94		
		MAY	76	75	82	79	121	103		
		JUN	72	69			101	96		
1979/80	LANCELIN	NOV	77	76	81	77				
		DEC							91	85
		JAN	69	67			87	97		
		FEB	71	69	78	76				
		MAR	70	69	91	84	83	87		
		APR	69	68	71	71				
		MAY	70	69			91	86		
		JUN	73	70						
1979/80	JURIEN	NOV	75	73	72	70				
		DEC	78	75			81	76	83	79
		JAN					87	81	80	75
		FEB	75	71			83	83		
		MAR	75	73	79	76	83	82	86	84
		APR	77	74			83	83		
		MAY	80	74	74	72				
		JUN	75	72	76	73				
1979/80	DONGARA	NOV	71	69	79	75				
		DEC					86	82	85	79
		JAN	74	73	74	74	87	94	92	91
		FEB	77	75	74	73			96	90
		MAR	77	74	82	79			90	88
		APR	73	71	76	75			89	82
		MAY	77	75			99	90	99	88
		JUN	74	72	74	72				

TABLE 4: BOTTOM TEMPERATURE (^{o}C) AND SURFACE SALINITY IN PARTS PER THOUSAND FOR FREMANTLE, LANCELIN, JURIEN AND DONGARA OF WATERS BETWEEN VARIOUS DEPTH CONTOURS FOR THE 1979/80 SEASON

AREA	DEPTH FATH.	NOV		DEC		JAN		FEB		MAR		APR		MAY		JUN	
		TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL
FREMANTLE	0-10	20.1	35.85	21.2	36.20	24.2	36.62	21.9	36.60	22.25	35.24	19.4	36.12	19.5	35.36	17.2	35.23
	10-20							-	35.80					21.3	35.47		
	20-30					22.4	35.96			22.5	35.51	13.2	35.49	20.8	35.44	17.6	35.26
	30+			20.9	35.66												
LANCELIN	0-10	22.1	35.94			24.0	36.45	22.8	36.35	21.3	36.07	20.1	35.86	20.6	35.19	18.6	-
	10-20	21.2	35.79					21.7	36.15	22.0	35.64	21.8	35.62				
	20-30					22.9	35.79			22.0	35.49						
	30+			21.6	35.63												
JURIEN	0-10	21.5	35.84	20.6	35.76	23.4	36.39	23.0	36.73	22.9	36.31	21.0	35.52	20.0	35.60	18.2	35.39
	10-20	21.0	35.98							21.9	35.89			20.6	35.53	17.5	35.47
	20-30			20.2	35.56	23.0	35.60			22.0	35.60	22.3	35.36				
	30+			-	35.76	23.2	35.52			22.0	35.80						
DONGARA	0-10	21.5	36.07			-	36.00	22.5	36.31	25.2	35.82	19.3	35.85	21.0	35.49	19.1	35.38
	10-20	21.3	35.63			22.8	35.86	22.7	35.89	20.1	35.91	21.5	35.67				
	20-30			21.2	35.57	22.0	35.69	21.8	35.71					21.5	35.40		
	30+					23.2	35.69			20.2	35.68	21.0	35.39	21.2	35.37		

TEMPERATURES WERE TAKEN USING A PROTECTED REVERSING THERMOMETER AND SURFACE WATER SAMPLES WERE TAKEN AND LATER ANALYSED TO DETERMINE SALINITY.

TABLE 5: 1979/80 SEX RATIO BY MONTH AND DEPTH CATEGORY, FIGURES ARE % OF FEMALES IN THE TOTAL SAMPLED CATCH.

AREA	DEPTH RANGE FATH.	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
DONGARA	0-10	53		49	47	52	52	52	51
	10-20	62		62	56	62	68		55
	20-30		67	89				73	
	30+		69	79	72	74	80	68	
JURIEN	0-10	58	65		50	54	54	60	54
	10-20	64				70		55	51
	20-30		64	73	79	69	64		
	30+		74	69		71			
LANCELIN	0-10	58		61	57	56	59	57	55
	10-20	59			61	60	61		
	20-30			88		67		68	
	30+		68						
FREMANTLE	0-10	68	63	56	53	53	49	51	65
	10-20				64	62		63	
	20-30			73	86	52	60	40	60
	30+		55						

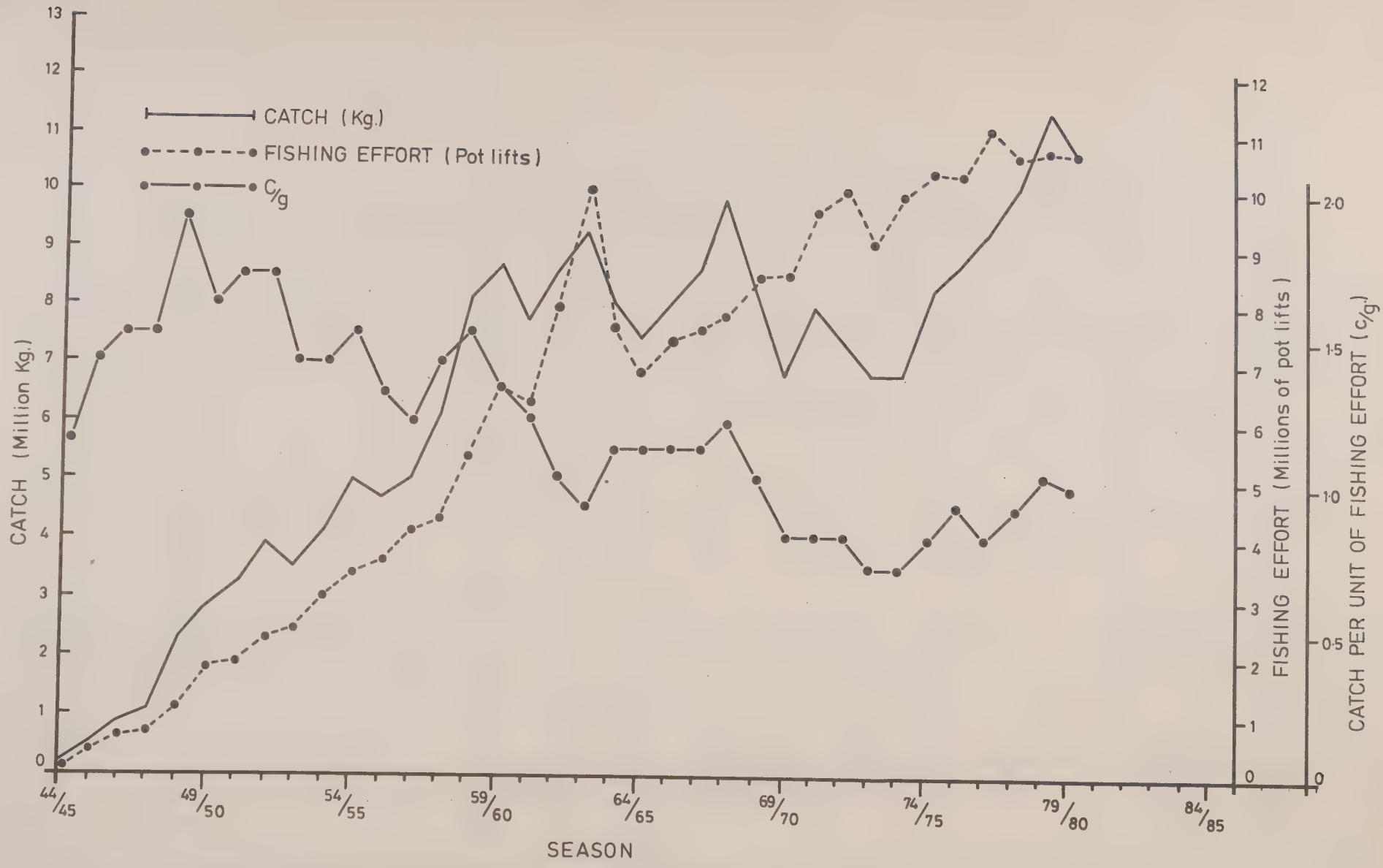

FIGURE 1. ROCK LOBSTER CATCH (KG), FISHING EFFORT (POT LIFTS)* AND CATCH PER UNIT OF FISHING EFFORT (c/g) DATA.

*Prior to the 1977/78 season, fishing effort was calculated as effective fishing effort by the method of Gulland (1969). The complete set of fishing effort data shown here (1944/45 to 1979/80) is obtained as described in the footnote on page 6.

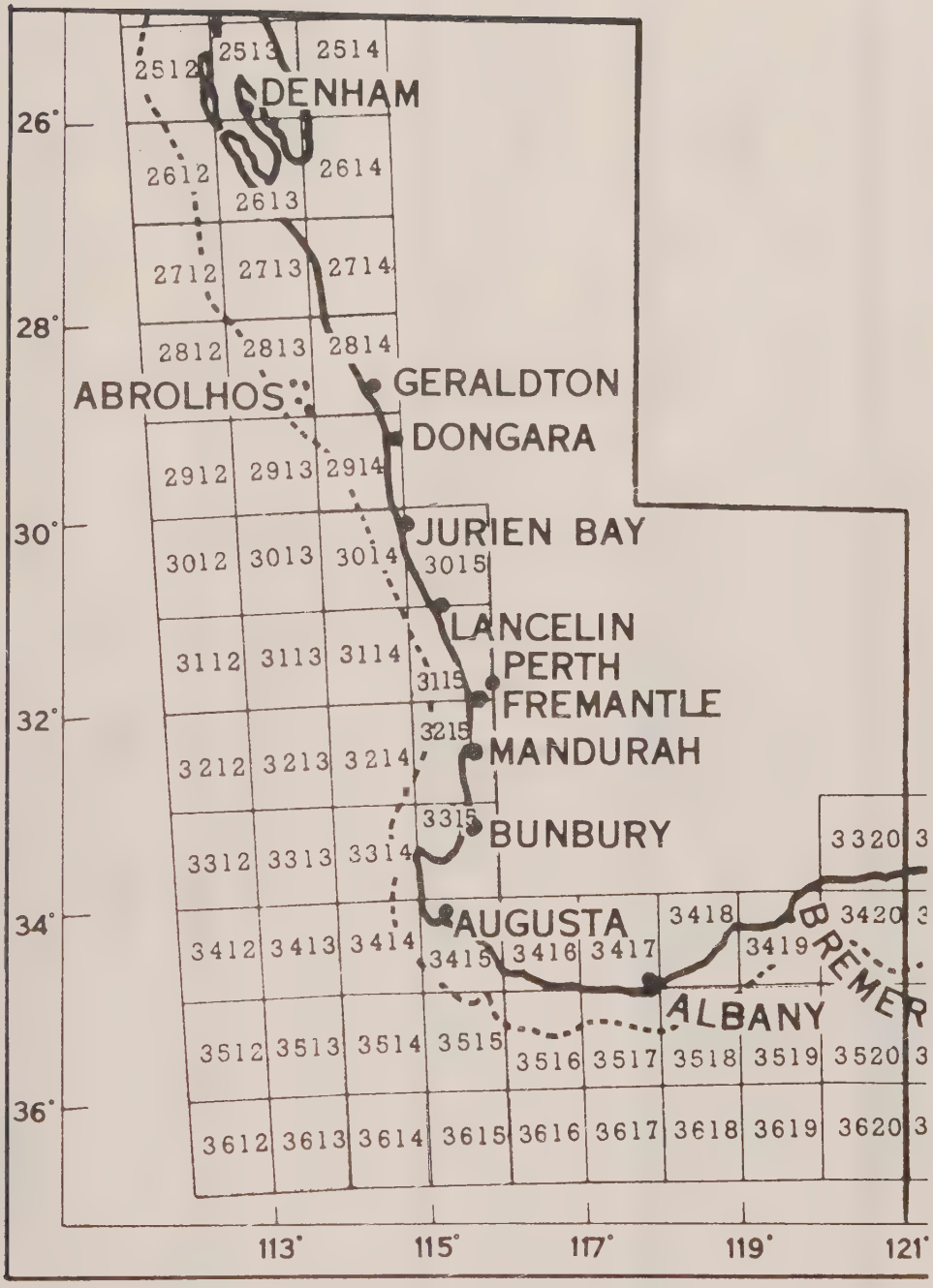

FIGURE 2. Rock Lobster Fishing Areas

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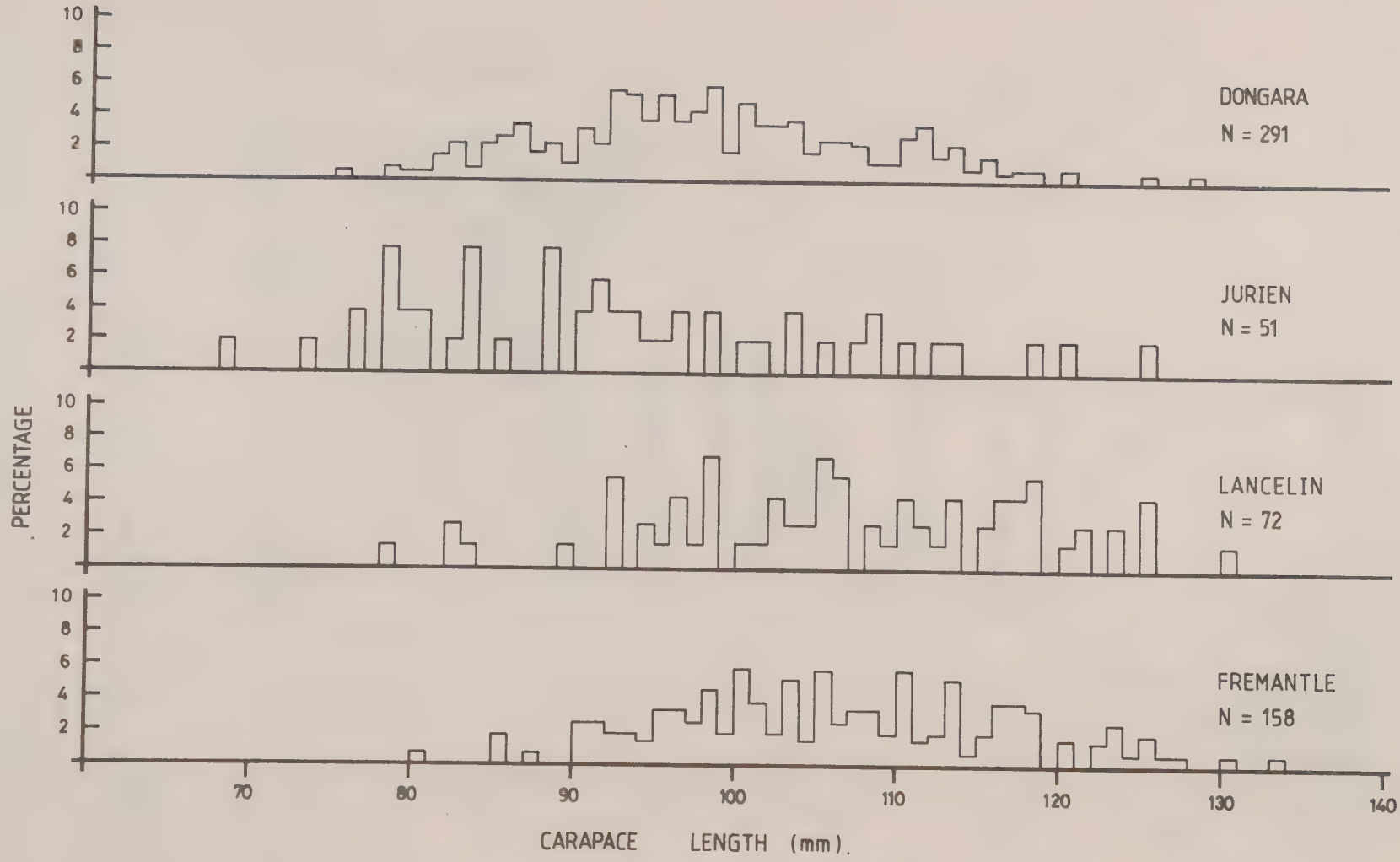

FIGURE 3. LENGTH FREQUENCY OF BREEDING FEMALE ROCK LOBSTERS TAKEN FROM DECEMBER 1979 TO FEBRUARY 1980.

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